

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in this application:

Listing of Claims:

1. (Currently Amended)

Process for the continuous production of an ultrathin hot rolled steel strip from a thin slab obtained by continuous casting in a mould, comprising ~~the following process steps:~~

- a continuous casting step (1);
 - a pre-transformation (5) subsequent to the continuous casting step (1);
 - an induction heating (8); and
 - a final transformation (18) with previous plastic stretching (17), descaling (17a) and subsequent cooling and coiling,
- characterized by:
- the slab leaving the mould with a central crown ~~of a value preferably between 0,5 and 5,0 mm~~ at each side;
 - a reduction of ~~the~~ a slab thickness in continuous casting during ~~the~~ solidification (3.1) by 60% at maximum, from 100 to 70 mm, until a reduction from 80 to 40 mm;
 - a secondary cooling during ~~the~~ a liquid steel core reduction step (3B) of the continuous casting step (1), performed ~~only~~ by spray nozzles (3a), with the following characteristics:
 - ± specific water delivery between 0.6 and ~~3.0~~ liters 3.0 liters per kg of cast steel,
 - ± decreasing cooling density in the direction of ~~the slab~~ the slab advancement due to liquid core reduction, and
 - ± selective control of cooling fluid flow rates between ~~the~~ a front side and ~~the~~ a back side of the slab;
 - said pre-transformation being a roughing (5) step of the thin slab upon solidification at a surface temperature of the slab > 1100°C with not more than four passes to obtain an intermediate strip (5.3) having different thicknesses chosen in the range from 30 to 8 mm with a central crown of up to 0.4 mm at each side;

- said induction heating (8) being adapted to fix various temperatures of the intermediate strip chosen between 1000 and 1400°C and overheating function of the a head and tail;
- said plastic stretching (17) combined with descaling (17a) to eliminate scale from the surface of the intermediate strip;
- said final transformation (18) being a rolling step down to a thickness of the a finished strip of 0.4 mm as a minimum with not more than six passes and a controlled temperature of the a hot rolled strip at the an exit therefrom > 750°C (AC1); and
- a controlled cooling (14) of the a strip (13) in the time between the end of the a final rolling (18) and the coiling until a minimum temperature of 200° C according to the a corresponding T.T.T. diagram (14.1) specific for the a steel quality of the strip thickness.

2. (Currently Amended)

Process according to claim 1, characterized in that said roughing step (5) occurs directly after the slab solidification with a relatively hot core (7) of the slab at a temperature of less than 1450°C, near the temperature of steel solidification (7.1) higher than 1100°C, thereby with an inverted temperature gradient (7.2) throughout half thickness of the slab.

3. (Currently Amended)

Process according to claim 2, characterized in that immediately after the roughing step ~~(5)~~ (5), the intermediate strip (5.3) ~~can be separated~~ is subjected to a crosswise, preferably cut separation step by cutting (10).

4. (Currently Amended)

Process according to claim 3, characterized in that directly after the ~~possible~~ separation ~~(10)~~ of the intermediate strip strip, a withdrawal (11) of plate-shaped sheets is possible by means of a cross-wise transportation.

5. (Currently Amended)

Process according to claim 1, characterized in that the intermediate strip (5.3) ~~can be is~~ either directly guided to the ~~final rolling~~ said final transformation (18) immediately after the

temperature regulation by induction heating (8) in case of continuous rolling (15) or is subject to an intermediate winding (16.1) before the final rolling.

6. (Currently Amended)

Process according to ~~claim 1~~ claim 1, characterized in that the intermediate strip (5.3) ~~can be~~ is rolled in a controlled way through six passes in a finishing mill at a maximum to a finished hot rolled strip (13) with a minimum thickness of 0.4 mm and a temperature of transformation in a range at the exit of the finishing mill from the ~~last sixth~~ pass of final rolling (18) in a range (24) between a minimum of 750°C (AC1) ~~and preferably a maximum of 900°C (AC3).~~

7. (Currently Amended)

Process according to ~~claim 5~~ claim 6, characterized in that the intermediate strip (5.3) ~~can enter~~ enters the finishing mill (18) at different speeds between 0.2 and 5.0 m/s.

8. (Currently Amended)

Process according to ~~claim 1~~ claim 6, characterized in that between the ~~last sixth~~ rolling pass and the coiling ~~step~~ step, the finished hot rolled strip (13) ~~can be brought~~ is carried in a thermally controlled way and in the time to a final temperature higher than 200°C ~~and thermomechanically through a thermally controlled management~~ (14) according to the T.T.T. diagram (14.1).

9. (Currently Amended)

Process according to claim 8, characterized in that the thermally controlled management (14) in the time of the hot finished strip (13) with a determined thickness and chemical composition (steel analysis) by means of a cooling strategy ~~thanks to~~ via a cooling line (19.1), (20.1), as well as to an isolation or heating line (20.3) based on the corresponding T.T.T. diagram (14.1) the desired structures and properties of the material are obtained and consequently the desired steel quality (23) between the ~~last sixth~~ rolling pass and the coiling step.

10. (Original)

Process according to claim 9, characterized in that the finished hot rolled strip (13) is wound with the desired properties of the material.

11. (Currently Amended)

Process according to claim 9, characterized in that the finished strip (13) with the desired material properties ~~can be~~ of the material is directly brought to subsequent working steps (20.2) without preliminary winding.

12. (Currently Amended)

Process according to ~~any one~~ claim 1, ~~characterized by~~ comprising a process control system (22) provided with specific parameters for the steel ~~type~~ quality according to the T.T.T. diagram (14.1) for a treatment rolling (14) of thermo-mechanical nature, consisting in a main master system (22.7) and six process subsystems (from 22.1 to 22.6) for programming, performing and controlling the ~~whole~~ process.

13. (Currently Amended)

Production line for carrying out the process of claim 1, comprising a continuous casting machine 1, for the continuous casting of thin ~~slab~~ slabs (3) with a mould ~~with~~ having a width of 2.2 m at maximum and an exit (or outlet) for a thickness at the mould exit of 100-70 mm with of the slab at a position (3.1) immediately downstream of the mould exit having production lines connected thereto, ~~such as~~ namely:

- a roughing mill (5) with not more than four rolling stands;
- an induction heating path (8);
- a finishing mill (18) with not more than six rolling stands;
- at least one coiling station (20); and
- a cooling line between the finishing mill (18) and the coiling station (20),
- characterized by the fact that said continuous casting machine (1) is able to give a crowned shape of the cross section of the ~~slabs~~ slabs, and the production line further comprising ~~in-particular:~~

- a roller table (3) for reducing the slab (3.1) thickness during the solidification from 100 to 70 mm at the mould exit up to a solidification thickness (3.2) of 80-40 mm within the said roller table itself at the a casting speed as high as possible (2.3) of 10m/min;
- a secondary spray cooling system (3B) by means of spray nozzles in correspondence with the said casting machine (1);
- said roughing mill (5) being equipped with rolls suitable to obtain a crown of up to 0,4 mm at each side;
- said induction heating path (8) having a length of 40 m at maximum, immediately downstream of the roughing mill (5) with temperatures of intermediate strip (8.1) ~~at the furnace exit~~ upon leaving said path (8) of 1100-1400°C and suitable to ~~manage the control~~ specific of a temperature regulation overheating of the a head and tail of the intermediate strip by means specific of a temperature regulation algorithm; and
- a plastic stretching device (17) combined with a descaling device (17a), placed before said finishing mill (18), composed of a battery of upper and lower rolls in a total number of at least three.

14. (Original)

Production line according to claim 13, characterized in that said roughing mill (5) is placed directly at the end of the continuous casting machine (1) at a distance of 10 m therefrom.

15. (Currently Amended)

Production line according to claim 13, characterized in that immediately after the roughing mill (5) there is provided a ~~device for transverse cutting (10), preferably a shearing device.~~

16. (Original)

Production line according to claim 15, characterized in that immediately after the transverse cutting device or shears (10) there is provided a cross-wise transportation device for the removal of plates from the intermediate strip.

17. (Original)

Production line according to claim 13, characterized in that between the induction heating path (8) and the plastic stretching device (17) there is provided an intermediate winding station (16.1) immediately upstream of the finishing mill (18).

18. (Original)

Production line according to claim 13, characterized in that the distance between the stands of the finishing mill (18) is of 6 m at maximum.

19. (Currently Amended)

Production line according to claim 13, characterized in that immediately after the last stand of the finishing mill (18) there is provided a coiling station (19), preferably in the form of a carousel coiler, being preceded by an intensive cooling line (19.1).

20. (Currently Amended)

Production line according to claim 19, ~~characterized by~~ comprising an additional conventional cooling line for hot rolled strip (20.1) with at least one downcoiler station (20) at the end of the ~~whole~~ production line.

21. (Currently Amended)

Production line according to ~~claims 19~~ claim 20, characterized in that the cooling lines (19.1; 20.1) ~~can be also~~ are equipped with an isolating line and/or an induction heating furnace (20.3).

22. (Currently Amended)

Production line according to claim 13, characterized in that the hot rolled strip, being rolled and cooled ~~in a thermally controlled manner and in the time according to a programmed thermo-mechanical rolling~~ (14) is directly brought to the subsequent working line without preliminary coiling.

23. (Currently Amended)

Production line according to claim 13, ~~characterized by~~ comprising a process control system (22) consisting in a "master" main system (22.7) and additional six peripheral subsystems (22.1-22.6) for programming, guiding and controlling the ~~whole~~ production line.

24. (Currently Amended)

Production line according to claim 23, characterized in that the process control system (22) receives from ~~the outside, such as the~~ a programming central computer system, specific parameters ~~relating to the~~ depending on steel quality for thermo-mechanical rolling (14) according to the T.T.T. diagram (14.1), ~~the hot rolled strip when with the exit temperature from the last stand of leaving~~ the finishing mill (18) has a temperature in the a range AC3/AC1 (24) of said T.T.T. diagram (14.1) between 900 and 750°C.